

## WHAT IS CLAIMED IS:

1        1. A method for monitoring a battery installed in a vehicle comprising:  
2                utilizing a system provided within the vehicle to determine that a test of the  
3        battery should be performed when a first condition is satisfied;  
4                electrically coupling at least one vehicle load to the battery; and  
5                utilizing the system to analyze the response of the battery to the at least one  
6        vehicle load coupled to the battery;  
7                whereby the system may be utilized to determine the state of health of the  
8        battery.

1        2. The method of Claim 1 wherein the system provided within the vehicle  
2        comprises a battery monitoring and management system.

1        3. The method of Claim 1 wherein the step of determining that a test of the  
2        battery should be performed comprises determining that the battery has been newly installed  
3        in the vehicle.

1        4. The method of Claim 3 wherein the step of determining that a test of the  
2        battery should be performed comprises receiving an input signal from an input device  
3        indicating that the battery is newly installed in the vehicle.

1        5. The method of Claim 3 wherein the step of determining that a test of the  
2        battery should be performed comprises inferring that the battery is newly installed in the  
3        vehicle.

1        6. The method of Claim 5 wherein the step of inferring that the battery is newly  
2        installed in the vehicle comprises determining that at least one vehicle system has lost power.

1        7. The method of Claim 6 wherein the step inferring that the battery is newly  
2        installed in the vehicle further comprises testing the battery and comparing results of the  
3        testing with results of testing prior to the power loss to determine that a different battery has  
4        been installed.

1        8.     The method of Claim 1 wherein the step of determining that a test of the  
2 battery should be performed comprises determining that a predetermined amount of time has  
3 passed.

1        9.     The method of Claim 8 wherein the predetermined amount of time comprises  
2 a predetermined amount of time since the battery was last used.

1        10.    The method of Claim 1 wherein the step of determining that a test of the  
2 battery should be performed comprises determining that the battery has been used for a  
3 predetermined number of vehicle starts.

1        11.    The method of Claim 1 wherein the step of determining that a test of the  
2 battery should be performed comprises determining that the vehicle has experienced a  
3 predetermined number of weak starts.

1        12.    The method of Claim 1 wherein the step of determining that a test of the  
2 battery should be performed comprises determining that the battery has been cycled a  
3 predetermined number of times.

1        13.    The method of Claim 1 wherein the first condition comprises at least one of a  
2 voltage level of the battery approaching a predetermined threshold, the current level of the  
3 battery approaching a predetermined threshold, and a slope of the voltage of the battery with  
4 time approaching a predetermined threshold.

1        14.    The method of Claim 1 wherein the step of electrically coupling at least one  
2 vehicle load to the battery comprises sending a signal from the system to couple the at least  
3 one vehicle load to the battery.

1        15.    The method of Claim 1 wherein the step of electrically coupling at least one  
2 vehicle load to the battery comprises electrically coupling at least one relatively low current  
3 load and at least one relatively high current load to the battery.

1        16.    The method of Claim 15 wherein the step of electrically coupling at least one  
2 relatively low current load and at least one relatively high current load to the battery  
3 comprises applying a first load to the battery, removing the first load from the battery, and  
4 applying a second load to the battery.

1        17. The method of Claim 15 wherein the step of electrically coupling at least one  
2 relatively low current load and at least one relatively high current load to the battery  
3 comprises concurrently applying both the low current load and the high current load to the  
4 battery.

1        18. The method of Claim 15 wherein the relatively high current load is between  
2 approximately 3 and 20 amperes and the relatively low current load is between approximately  
3 20 and 100 amperes.

1        19. The method of Claim 1 wherein the at least one vehicle load comprises at least  
2 one load applied by a device selected from the group consisting of a window defroster, an air  
3 conditioning system, a windshield wiper motor, a vehicle seat heater, a vehicle seat  
4 adjustment mechanism, and a vehicle entertainment system.

1        20. The method of Claim 1 wherein the at least one vehicle load comprises at least  
2 one load resulting from an extended engine crank.

1        21. The method of Claim 1 wherein the at least one vehicle load comprises at least  
2 one load provided by a sensor coupled to a vehicle communication system.

1        22. The method of Claim 21 wherein the sensor coupled to a vehicle  
2 communication system comprises a current sensor.

1        23. The method of Claim 1 wherein the step of analyzing the response of the  
2 battery to the at least one vehicle load coupled to the battery comprises analyzing the voltage  
3 response of the battery to the at least one vehicle load.

1        24. The method of Claim 1 wherein the step of analyzing the response of the  
2 battery to the at least one vehicle load coupled to the battery comprises analyzing the current  
3 response of the battery to the at least one vehicle load.

1        25. The method of Claim 1 wherein the step of analyzing the response of the  
2 battery to the at least one vehicle load coupled to the battery comprises analyzing the charge  
3 current acceptance of the battery when the engine of the vehicle is in operation and the  
4 alternator is providing sufficient voltage to charge the battery.

1        26. The method of Claim 1 wherein the step of analyzing the response of the  
2 battery to the at least one vehicle load coupled to the battery comprises comparing an input  
3 signal received from the battery to historical information for the battery.

1        27. The method of Claim 1 wherein the step of analyzing the response of the  
2 battery to the at least one vehicle load coupled to the battery comprises comparing an input  
3 signal received from the battery to information included in a lookup table.

1        28. The method of Claim 1 further comprising providing an output signal if the  
2 battery is determined by the system to satisfy a second condition.

1        29. The method of Claim 28 wherein the output signal comprises a signal to  
2 disconnect one or more loads from the battery.

1        30. The method of Claim 28 wherein the output signal comprises at least one  
2 signal selected from the group consisting of a signal to instruct a voltage regulator to apply a  
3 greater charge to the battery and a signal to alter the idle speed of the vehicle.

1        31. The method of Claim 28 wherein the output signal is at least one of a visual  
2 and an audible signal.

1        32. The method of Claim 28 wherein the step of providing an output signal if the  
2 battery is determined by the system to satisfy a second condition comprises determining that  
3 the battery cannot support engine cranking for a predetermined amount of time.

1        33. The method of Claim 28 wherein the step of providing an output signal if the  
2 battery is determined by the system to satisfy a second condition comprises determining that  
3 at least one of the current and the voltage of the battery declines during application of the at  
4 least one vehicle load by a predetermined amount.

1        34. The method of Claim 28 wherein the output signal comprises at least one of a  
2 visual signal and an audible signal.

1        35. A system for monitoring a vehicle battery using a method as recited in any of  
2 the preceding claims, the system comprising:  
3              a battery installed within a vehicle;

4                   a system that may be selectively electrically coupled to the battery for carrying  
5                   out the method; and

6                   a vehicle electrical system comprising a plurality of loads that may be  
7                   selectively electrically coupled to and decoupled from the battery.

1                 36.    The system of Claim 35 wherein the vehicle electrical system comprises a  
2                   plurality of relatively high current loads and a plurality of relatively low current loads.

1                 37.    The system of Claim 35 wherein the plurality of loads comprise at least one  
2                   vehicle load selected from the group consisting of a window defroster, an air conditioning  
3                   system, a windshield wiper motor, a vehicle seat heater, a vehicle seat adjustment  
4                   mechanism, a vehicle entertainment system, and a sensor coupled to a vehicle communication  
5                   system.